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Laparoscopic total mesorectal excision for rectal cancer

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CHAPTER 8

PSYCHOPHYSIOLOGICAL ASSESSMENT OF SEXUAL FUNCTION IN WOMEN AFTER RADIOTHERAPY AND LAPAROSCOPIC TOTAL MESORECTAL EXCISION FOR RECTAL CANCER

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Abstract

Aims: The potential contribution of psychological and anatomical changes to sexual dysfunction in female patients following short-term preoperative radiotherapy (5 x 5 Gy) and laparoscopic Total Mesorectal Excision (LTME) is not clear.

Methods: A detailed assessment of sexual functioning was carried out in four women, 2 after LTME and 2 after open TME (OTME), using both vaginal photoplethysmography, validated Questionnaire for Screening Sexual Dysfunction (QSD) and an in-depth interview. All investigations were done at least 15 months after treatment. The results were compared with an age-matched group of 18 healthy women.

Results: LTME, OTME patients and healthy controls showed comparable changes in vaginal vasocongestion during sexual arousal, though 3 out of 4 patients showed a lower Mean Spectral Tension (MST) of the vaginal pulse compared with healthy controls. Subjective sexual arousal was equivocal between the three groups.

Conclusion: In this study the changes of genital and subjective sexual arousal after erotic stimulus condition between patients, undergoing LTME or OTME, and healthy controls were not different, though lower MST of the vaginal pulse was found in 3 out of 4 patients compared to healthy women.

Introduction

Sexual dysfunction is a recognized complication in patients undergoing Open Total Mesorectal Excision (OTME)¹⁻⁴. However, these data especially address male sexual impairment. Sexual dysfunction in women after Laparoscopic TME (LTME) has also not received much attention yet⁵⁻⁷.

TME for rectal cancer may cause surgical damage to the autonomic nerves resulting in disruption of the nerve supply to the vaginal blood vessels which is responsible for the neural control of lubrication⁸. Besides surgery, also radiotherapy may compromise female sexual function. Radiotherapy may cause fibrosis of the vagina affecting vascular permeability or damage of the small vessels leading to decreased blood flow and less genital response. Furthermore radiotherapy is associated with direct toxicity of the autonomic nerves. Recent studies have shown the negative impact of radiotherapy on sexual function in cervical cancer^{9,10}.

LTME has shown to achieve oncological resection equivalent to that of OTME¹¹. Moreover LTME has clinically relevant short-term advantages compared to OTME¹¹⁻¹³. Theoretically, LTME may limit nerve disruption due to better exposure and magnification of the pelvic cavity as compared with OTME.

Data reporting on female sexual functioning after LTME originated from questionnaire based studies of small samples^{3,14}. One was a retrospective study in which no significant difference between the LTME and OTME group was found¹⁴. The other study did not report a significant difference between the laparoscopic and open group either, though the response rates were low and there were a large number of missing data of the female patients³. There are no data giving more information about psychosexual functioning of female patients after LTME or OTME.

Sexual dysfunction is an entity in which multiple psychological and somatic factors are involved¹⁵. In healthy women photoplethysmographic vaginal pulse amplitude (VPA) is reliable in assessing the increase in vaginal blood flow during sexual arousal¹⁶. This technique has not yet been used after LTME and OTME. In this study we assessed female sexual dysfunction after radiotherapy, LTME and OTME by vaginal photoplethysmography, the validated Questionnaire for Screening Sexual Dysfunction, and by a validated in- depth interview. We compared the results with healthy controls.

Patients and methods

This study describes two patients treated with short-term preoperative radiotherapy (5 x 5 Gy) and LTME for rectal cancer. With a minimal follow-up of 15 months patients were invited to participate in this study. A follow-up of 15 months was chosen because at that time the late side- effects of radiotherapy and the natural restoration of both psychological and surgical factors had reached their plateau phase.

The results of these two patients were compared with two patients who underwent OTME and a control group of 18 healthy women with a mean age of 47 (range 36-59) years. The latter group was recruited by an advertorial in the local newspaper. During the study days participants were asked not to use drugs or alcohol and to refrain from sexual activities. The study was approved by the Committee on Medical Research Ethics and all patients and volunteers provided written informed consent.

Vaginal plethysmography

The patients underwent vaginal plethysmography to measure changes in vaginal vasocongestion¹⁷. The plethysmograph is a menstrual tampon-sized device containing a light source and a photocell. The light source illuminates the capillary bed of the vaginal tissues and changes in light intensity are converted into an electrical resistance by the photocell. This signal is subsequently converted into an electrical current (Volts) and then amplified, filtered, and made suitable for further statistical analysis.

The tampon was placed at a fixed position inside the vagina with a plastic ring connected to the cord of the tampon¹⁶. During the test, the woman sat in a comfortable chair in a special room, isolated from the measuring equipment and test researcher.

Plethysmography at baseline.

The women watched a neutral videotape showing word games five minutes. During this phase (rest phase 1) the vaginal blood flow was measured to obtain a baseline value

Plethysmography at sexual arousal.

After the baseline phase a five minutes erotic video fragment of a lovemaking couple during foreplay and a short period of intercourse was shown (erotic phase 1). The erotic video fragments were taken from female-initiated and female-centered erotic videotapes¹⁸. After this first phase of sexual arousal the women watched another part of the neutral word game video during five minutes (rest phase 2), which served as a distraction from the erotic stimuli. Thereafter the erotic video was played for yet another five minutes showing a different erotic video fragment (erotic phase 2).

Analysis of the plethysmographic signals.

Out of each test phase approximately the last minute of the recordings was chosen for further analysis. An extensive description of this analysis has been published by one of the authors¹⁹. Shortly, the one minute signals show a wave pattern, representing the vaginal pulse rate, *i.e.* the pulsation of the blood flow in the vaginal wall resulting from the heartbeat. The amplitude of this vaginal pulse (VPA) is a reliable measure of the genital response during sexual arousal, with larger amplitudes reflecting higher levels of vaginal blood flow²⁰.

An accurate measure of the vaginal pulse amplitude can be obtained by means of frequency analysis¹⁹. In frequency analysis, the complex waveforms in the signal are unravelled into waves with the same frequency (waves/min). The peaks between 5 and 25 waves/minute reflect the breathing movements. The peak between 50 and 100 waves/minute is the spectral representation of the VPA. The surface of this peak is, therefore, a reflection of the genital response during sexual arousal and is called the mean spectral tension of the vaginal pulse (MST).

The MST from each of the four test phases were used for the statistical analysis of the changes in the plethysmographic signals. In the statistical analysis, MST in the first phase was taken as baseline value to exclude the inter-individual variation in the MST. The changes in MST from the second to the fourth measurement phases (MST_n)

are expressed as difference scores in relation to this baseline value (MST_0) according to the formula $dB=20 \log MST_n/MST_0$.

Before the test and after each of the four measurements periods, the women scored their subjective feelings of sexual arousal on a visual analog scale (VAS), with 1 representing 'not sexually aroused at all' to 7 'very strongly sexually aroused'.

Questionnaires for screening sexual dysfunction (QSD)

The QSD is a multidimensional self-report questionnaire with subscales on sexual behaviour problem frequency and experienced distress²¹. Frequencies of sexual desire/sexual activities are rated on seven point scales. Frequencies of problems during sexual contact with the partner (or masturbation), trouble with these items and satisfaction are rated on five-point scales. The QSD also asks for sociodemographics, *i.e.* age, marital status and education.

Interview

Patients were interviewed by a psychologist (HBM vd W) about their sexual life. The interviews took place in the hospital and lasted about three quarters of an hour. All participants gave their permission in advance for the interview to be tape-recorded. In the interviews special attention was given to subjective changes in the following aspects of sexual functioning: 1) sexual activity, 2) feelings of sexual arousal and orgasm, 3) sexual satisfaction, 4) sexual relationship due to treatment, 5) sexual problems due to treatment.

Statistics

For the questionnaires, interviews, and vaginal plethysmography data the differences between the patients and the control group were not tested on statistical significance because of the limited number of observations. The comparison between the patients group and controlgroup gives an indication of how to interpret the data of the patientgroup.

Regarding, vaginal plethysmography for the healthy control group, a repeated measures analysis of variance (ANOVA) was performed for the decibel scores. Pearson's correlation coefficients were calculated between the genital sexual arousal and the subjective sexual arousal using the data from all the measurement periods of all subjects ($n=72$). P-values < 0.01 were considered significant.

Results

Two LTME, two OTME and 18 volunteers participated in the study. Table 1 shows the characteristics of the patients and healthy control group.

Table 1. Patient and healthy control characteristics

	LTME n=2	OTME n=2	healthy controls n=18
Age; mean (range)	53 (52-54)	66 (61-70)	47 (36-59)
Time interval (months) between treatment and test; mean (range)	44 (39-48)	28 (17-38)	
Tumour classification			
T1N1M0	1	0	
T2N0M0	1	1	
T2N1M0	0	1	
Type or resection			
LAR	2	1	
APR	0	1	
Comorbidity			
none	2	1	
hypertension	0	1	
Medication			
none	2	0	
hydrochlorothiazide	0	1	
Postmenopausal	2	2	7
Marital status			
married or living with a man	2	2	10
has a partner but lives alone	0	0	0
single	0	0	8
Level of education			
primary school	0	0	0
secondary school	2	2	17
university	0	0	1

LAR: low anterior resection; APR: abdominoperineal resection

Patient A

Patient A is 54 years old woman married with a male partner. The couple has two children. She was treated 4 years ago with short-term preoperative radiotherapy and LTME.

Table 2. Mean spectral tension (Volts) of LTME (n=2) and OTME (n=2) patients and healthy controls (n=18)

	rest phase 1 mean (sd)	erotic phase 1 mean (sd)	rest phase 2 mean (sd)	erotic phase 2 mean (sd)
patient A (LTME)	0.069	0.063	0.073	0.142
patient B (LTME)	0.264	0.460	0.290	0.509
patient C (OTME)	0.052	0.040	0.071	0.158
patient D (OTME)	0.020	0.179	0.086	0.138
controls	0.192(0.167)	0.398(0.303)	0.251(0.215)	0.561(0.546)

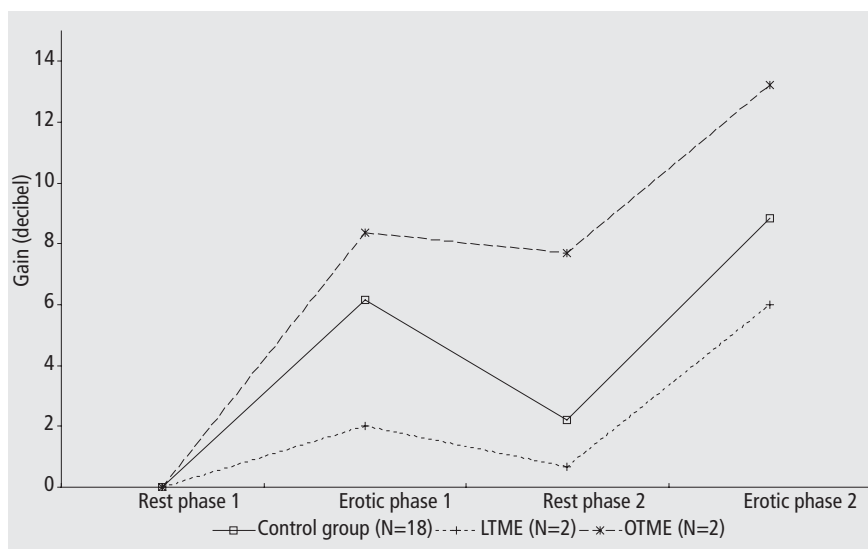


Figure 1. Mean changes in spectral tension (dB scores) of LTME (n=2) and OTME(n=2) patients and healthy controls (n=18); differences not significant.

Concerning genital sexual response measured by vaginal plethysmography there was no difference between first rest phase and the first erotic phase but in the second erotic phase a substantial rise of genital sexual arousal was seen compared with the second rest phase (Table 2, Figure 1). This was in concordance with her subjective feelings of sexual arousal scored on a VAS (figure 2). MST (Volts) in all four phases was lower than MST in healthy controls (Table 2).

The in-depth interview revealed that before treatment their sexual relationship has improved in the last couple of years mainly by overcoming their sexual embarrassment. They used to have sexual contact twice a week and orgasm could be achieved by digital stimulation or cunnilingus. Sexual arousal and orgasm was important for her but she found it not always necessary to reach an orgasm. Intimacy was more important at that time. Before treatment she was very satisfied with her sexual life expressed by an 8 in a score range from 0 to 10; a higher score indicating a better sexual life.

After treatment the desire to have sexual intercourse disappeared. Survival was at primal focus. Meanwhile there was more desire for intimacy. After 6 months they tried carefully for the first time to have sexual intercourse again. She noticed that she had no sexual sensations within and around her vagina anymore. Moreover, the sexual sensations of her breasts and nipples had also disappeared.

Nowadays their sexual life is comparable with their preoperative sexual life. The only thing that has changed is that cunnilingus is necessary to reach an orgasm. Expressed in figures she gives their sexual life the same figure, an 8, equal to before treatment.

Finally, she mentioned that she was very upset that nobody discussed with her the possibility of sexual dysfunction postoperatively. Preoperative, the information should not have been extensive, but some one should have told her something about this possible complication. In that case she would have been prepared for possible sexual dysfunction after treatment avoiding questions such as: "am I normal", "am I the only one", and "where should I go with my complaints".

On the QSD she reported impaired ability of sexual arousal and orgasm after treatment but this did not result in increased burden to herself or her partner. Overall the answers on the QSD showed that she was satisfied about her sexual life in general.

Patient B

Patient B is a woman of 52 years old and was treated more than 3 years ago for her rectal cancer. She underwent LTME after preoperative radiotherapy.

The genital response was low at baseline and in the second rest phase, when she watched the neutral video. Compared with these two neutral periods the arousal is higher in the first erotic phase and the highest in the second erotic phase (Figure 1).

The feeling of subjective sexual arousal reflected almost the same pattern as scores of the genital sexual arousal (Figure 2). MST was comparable or higher (rest phase 1 and erotic phase 1) compared with the control group (Table 2).

During the interview she mentioned that sex has never been the same since treatment. She had less interest, experienced less sexual sensation and less sexual arousal. But that was not the main problem. Especially the faecal incontinence in the beginning and gas production in the intestines nowadays limit her social functioning thoroughly. Making love not only feels different but is sometimes also very painful

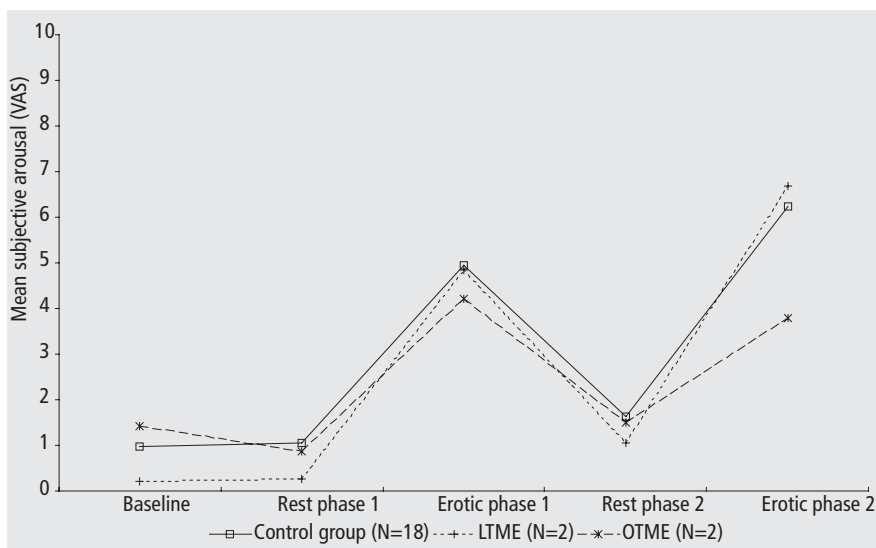


Figure 2. Mean scores for feelings of subjective arousal of the patients

because of the so-called "gas collection". Moreover, as she is also incontinent for flatus they sleep separately at the moment, not being conducive to romance between them.

Before treatment the initiative for making love came from both partners equally but nowadays he always has to initiate. However, she would not like to abandon the sex because "When we are making love then I enjoy it".

Concerning their relationship, nothing has really changed. After having both difficult and good times, at the end they always "find each other". Socially she experienced more difficulties. She used to baby-sit but at the moment she cannot do this anymore. Nowadays, she is frequently at home whereas she used to be a very busy woman. She had had a very difficult time after the treatment.

Her scores on the QSD resembled the interview. She experienced less sexual arousal and orgasm, but she had found a manner to cope this problem. In contrast with patient A, patient B masturbates during masturbation she described that physical factors had changed (such as experiencing less sensation and less lubrication) but this did not result in a feeling of loss.

Patient C

Patient C concerned a 61 year old woman who had been treated, 18 months ago, with short-term radiotherapy and an open abdominoperineal resection for rectal cancer.

The genital response was low during baseline, first erotic phase, and first neutral video, but a substantial rise was seen in the second erotic phase (Table 2, Figure 1). This is in contrast with the results scored on VAS; she reported both during the first (3.4) and second erotic phase (2.5) a rise in subjective genital arousal compared with baseline score (1.7) (Figure 2). As patient A, MST was lower in all phases than the healthy volunteers (Table 2).

During the interview the husband accompanied her and both were interviewed.

The couple gave a very relaxed impression. During discussing the medical history the positive attitude and soberness of both of them was striking. Despite having a permanent colostoma, it seemed that they had coped with the disease well and they had rebuilt their lives. The relationship had always been good and was intensified after treatment.

Regarding sexuality, she reported that after treatment she has no sensations at all in the genital area, including the clitoris. In the beginning, she had missed the sexual sensation a lot, but nowadays she is used to it, though she still misses the feeling of sexual arousal. After treatment they do not have sexual intercourse anymore. A small hypertrophic scar at the introitus prevents her partner having sex with her. She is not motivated for surgical intervention.

As sexual intercourse is not possible anymore, they have found a different way of making love with the help of yoga. In stead of having coitus they practise more a kind of "whole body contact". As a result they are not sexual aroused as such but experience a more energetic recharge after having such a session.

Nowadays, both of them experience a positive, energetic feeling whilst making love. As a result they often do have sex. Overall, expressed in figures her sexual life has decreased from 8 to 5 on a 10-point scale. The sexual life expressed by her partner, however, had increased from 5 to 8.

Besides the positive attitude of the couple, it is striking that after treatment the breasts of the patient were complete insensible, but lately she starts to feel sexual sensations again in her breasts.

On the QSD she reported both little sexual arousal and limited orgasm. This resulted in increased burden for herself. Moreover, nowadays physical limitations like erectile dysfunction of her partner and feeling pain during sex, are making sexual intercourse impossible. This also annoys her.

Patient D

Patient D is a 70 year old married woman, who underwent radiotherapy and an OTME more than 3 years ago.

Genital and subjective sexual arousal increased in response to the erotic video fragments (Table 2, Figure 1). The MST values were lower in all phases compared with healthy controls.

Patient D is married with a man who is 79 years old and he is recently treated for esophageal cancer. The interview showed that sexuality, including sexual arousal, masturbation, and coition, already was at a very low level before her treatment.

Both partners report that they enjoyed it in the old days but they do not have sex anymore. Moreover, the patient does not masturbate and therefore she cannot report on changes in her sexual life, neither in physical nor in psychological respect. In contrast there is a lot of intimacy between both partners, but that has not really changed due to treatment of rectal cancer.

In line with the findings of the interview, patient reported on the QSD that her sexual life actually has stopped.

Control group

Figure 3 shows the alternations in genital response of the three groups through time during the experimental session. At baseline and in the second neutral phase, when the women watched the neutral video, the genital response was low, although these responses were not equal (Figure 1). Compared with these two neutral periods the arousal was higher in the first erotic phase ($p < 0.001$) and the arousal was the highest in the second erotic phase ($p < 0.001$).

The feelings of subjective sexual arousal reflected almost the same pattern as the dB scores of the genital sexual arousal (Figure 2). There was a significant increase in subjective arousal between the first and second neutral video ($p < 0.001$). The subjective arousal was the greatest in the second erotic video period ($p < 0.001$).

The Pearson's correlation coefficient between the dB scores of genital sexual arousal and the feelings of sexual arousal was 0.496 ($p < 0.001$).

There was no significant difference seen between pre- and postmenopausal controls regarding genital sexual arousal.

Figure 1 and 2 suggest that there was no difference in the spectral changes and subjective sexual arousal between the LTME ($n=2$) or OTME ($n=2$) and the control group ($n=18$), nor between the LTME and OTME group respectively. However 3 out of 4 patients had lower MST during all video fragments compared with healthy volunteers (Table 2).

As data were limited ($n=4$) no statistical analyses between these groups could be performed.

Discussion

Radiotherapy and TME for rectal cancer may lead to sexual dysfunction in female rectal cancer. However, little is known on the precise mechanism of each treatment component, radiotherapy or TME, or impact of damage. Vaginal plethysmography in addition to psychological assessment may offer the opportunity for a better understanding of the interplay between physical and psychological processes in sexual dysfunction in these patients.

Our limited data show that both in LTME as OTME as in the control group genital sexual response and subjective sexual arousal increased in response to erotic video fragments. However in three out of four patients, one LTME and both OTME patients, decreased MST was seen compared with healthy controls during sexual stimulation.

This indicates that the physiological reaction on erotic stimuli in these patients may be probably intact but may function at a lower level. The observed lower MST might be explained by autonomic nerve damage caused by treatment, caused either by radiotherapy or (L)TME.

As this is the first study which evaluated the vaginal blood flow response through vaginal plethysmography after TME comparable studies reporting results after rectal surgery are lacking. Pras *et al.* compared changes in vaginal vasocongestion using plethysmography between patients treated with radiotherapy for gynaecological cancer and healthy women²². Surprisingly, they found no difference between the two groups as worse outcome was expected in the irradiated group due to fibrosis and obliteration

of small vessels. They explained their results by the fact that the epithelium of the vagina is probably thinner in irradiated patients and allows easier measurement of the vaginal blood flow.

Despite a lower MST, which was found in 3 out of 4 patients, patients felt an equally strong sexual arousal equivocal with healthy volunteers after erotic video fragments.

Low concordance between measurements of sexual arousal in women in comparison to men may be explained by the fact that women rely largely on external stimulus information, in contrast to men who react more on bodily stimuli, when assessing their subjective feeling state²³.

Confrontation with cancer does not necessarily have only negative consequences²⁴. For example, patient A, and C described that personal contact seem to be aimed more at intimacy. Patient A, B and patient C experienced less sexual arousal and orgasm after treatment, however all three patients had found a manner to cope with this loss. This phenomenon may be explained by the so called "response shift". This means that long term survivors seem to develop a conscious awareness that leads to new internal standards and a positive appreciation of everyday life²⁵.

The life-threatening nature of cancer, the treatment with an uncertain outcome and the possible limitations after treatment may put heavy pressure on a relationship²⁶. Often patients described intensification of the relationship, which was experienced in a positive way²⁷. In others, however, having cancer had an alienation effect, because it appeared that the partners had completely different coping styles or because existing differences and problems became more clear and could not withstand the extra pressure²⁴. In our study both patient A and C found that the relationship had become more intense because of all the things they had been through.

Specific to patient A was that she complained about the fact she was not informed about the possibility that she might develop sexual problems after treatment. Research in gynaecological cancer has shown that the communication between healthcare professionals and the women with cancer is not adequate²⁸. Reasons for not discussing sexual issues in this study included "it is not my responsibility", "embarrassment", "lack of knowledge and experience", and "lack of resources to provide support if needed". The results demonstrated that there is a need from the women's perspective to improve communication about sexual issues.

As this is a limited series and only the results of four patients are described our results are not to be generalized to the whole female population having rectal cancer. Furthermore, the results were collected retrospectively. It is likely that the opinions of the patients were coloured by their recent experiences. Finally, it is known that participants in sexuality studies tend to be more interested in sexual functioning than non-participants²⁹.

In future, health-care professionals should become more aware of the sexual difficulties of female patients with rectal cancer and better communication with female patients about sexual dysfunction both initially at diagnosis and throughout treatment and follow-up is necessary. Some of the difficulties experienced can be relieved by the use of lubricants for vaginal dryness and the use of vaginal dilators to prevent stenosis. If a woman suffers from serious psychological problems due to sexual dysfunction she might benefit from psychosexual counselling.

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